

Roll No. of Candidate: 2019 01121

Physics (New Scheme)

(INTER PART-II) 419-(I)

Group: I

Paper: II

Time: 20 Minutes

OBJECTIVE

Marks: 17

Code: 8471

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Attempt as many questions as given in objective type question paper and leave other blank.

1. Due to polarization, electric field E in a capacitor:
 - (A) increases
 - (B) decreases
 - (C) first increases then decreases
 - (D) remains same
2. If time constant in RC circuit is small, then capacitor is charged or discharged:
 - (A) slowly
 - (B) rapidly
 - (C) at constant rate
 - (D) intermittently
3. Kirchhoff's second rule is based on:
 - (A) law of conservation of energy
 - (B) law of conservation of mass
 - (C) law of conservation of charge
 - (D) law of conservation of momentum
4. S.I unit of magnetic permeability is:
 - (A) $\text{Wb A}^{-1}\text{m}^{-1}$
 - (B) Wb m^2
 - (C) Wb mA^{-1}
 - (D) Wb Am^{-1}
5. When ohmmeter gives full scale deflection, it indicates,
 - (A) zero resistance
 - (B) infinite resistance
 - (C) small resistance
 - (D) very high resistance
6. Lenz's law deals with the:
 - (A) magnitude of induced current
 - (B) direction of induced emf
 - (C) direction of induced current
 - (D) magnitude of induced emf
7. When current flowing through an inductor is doubled, then energy stored in it becomes:
 - (A) half
 - (B) four times
 - (C) one fourth
 - (D) double
8. In a capacitive circuit of A.C quantity, when $q = 0$, the slope of $q - t$ curve is:
 - (A) minimum
 - (B) maximum
 - (C) zero
 - (D) negative
9. When A.C passes through an inductor, voltage leads the current by an angle:
 - (A) 0°
 - (B) 45°
 - (C) 90°
 - (D) 180°
10. In extrinsic semi-conductors, doping is of the order of:
 - (A) 1 atom to 10^4
 - (B) 1 atom to 10^8
 - (C) 1 atom to 10^{16}
 - (D) 1 atom to 10^6
11. The Boolean equation for exclusive NOR gate is given by:
 - (A) $X = A \cdot B + B \cdot A$
 - (B) $X = A \cdot \bar{B} + \bar{B} \cdot A$
 - (C) $X = A \cdot \bar{B} + \bar{A} \cdot B$
 - (D) $X = A \cdot \bar{B} + \bar{B} \cdot A$
12. The potential barrier for silicon at room-temperature is
 - (A) 0.7 volt
 - (B) 0.5 volt
 - (C) 0.3 volt
 - (D) 0.9 volt
13. The unit of work function is:
 - (A) volt
 - (B) joule
 - (C) watt
 - (D) farad
14. An electron in H-atom is excited from ground state to $n = 4$, how many spectral lines are possible in this case?
 - (A) 3
 - (B) 4
 - (C) 5
 - (D) 6
15. Metastable state is _____ than normal excited state.
 - (A) 10^{-5} times larger
 - (B) 10^{-8} times smaller
 - (C) 10^{-3} times smaller
 - (D) 10^5 times larger
16. A pair of quark and antiquark make a:
 - (A) meson
 - (B) hadron
 - (C) lepton
 - (D) baryon
17. The force which is responsible for the breaking up of the radioactive elements is:
 - (A) strong nuclear force
 - (B) gravitational force
 - (C) electromagnetic force
 - (D) weak nuclear force

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(INTER PART-II) 419-(I)

Group: I

Paper: II

Time: 2:40 Hours

SUBJECTIVE

Marks: 68

Note: section I is compulsory. Attempt any THREE (3) questions from Section II.

(SECTION - I)

(2 × 8 = 16)

2. Write short answers to any EIGHT questions.

- i. Write any two properties of electric field lines.
- ii. Differentiate between electric potential and electric potential difference.
- iii. Describe the force or forces on a positive point charge when placed between parallel plates with similar and equal charges.
- iv. A particle having a charge of 20 electrons on it falls through a potential difference of 100 v. calculate the energy acquired by it in electron volts (ev).
- v. What is the function of grid in case of cathode ray oscilloscope?
- vi. How can you prefer potentiometer over voltmeter?
- vii. Why does the picture on a TV screen become distorted when a magnet is brought near the screen?
- viii. A plane conducting loop is located in a uniform magnetic field that is directed along the x-axis. For what orientation of the loop is the flux a maximum? For what orientation is the flux a minimum?
- ix. A metal rod of length 25cm is moving at a speed of 0.5ms^{-1} in a direction perpendicular to a 0.25 T magnetic field. Find the emf produced in the rod.
- x. State Lenz's Law and write its formula.
- xi. How would you position a flat loop of wire in a changing magnetic field so that there is no emf induced in the loop?
- xii. Four unmarked wires emerge from a transformer. What steps would you take to determine the turns ratio?

(2 × 8 = 16)

3. Write short answers to any EIGHT questions.

- i. Do bends in a wire effect its electrical resistance? Explain.
- ii. Define wheatstone bridge. Draw its circuit diagram.
- iii. Distinguish between emf and terminal potential.
- iv. Write the advantages and disadvantages of FM over AM.
- v. A sinusoidal current has rms value of 10 A. What is the maximum or peak value?
- vi. How does doubling the frequency affect the reactance of
 - a) An inductor
 - b) A capacitor
- vii. Distinguish between elastic deformation and plastic deformation.
- viii. Define stress and strain. What are their units?
- ix. What is meant by strain energy? Write its formula.
- x. How does the motion of an electron in an n-type substance differ from the motion of holes in a p-type substance?
- xi. Why is the base current in a transistor very small?
- xii. What is meant by a current gain of a transistor? Write its formula.

(2 × 6 = 12)

4. Write short answers to any SIX questions.

- i. If the speed of light were infinite, what would the equations of special theory of relativity reduce to.
- ii. Can pair production take place in vacuum? Explain.
- iii. What are black body radiations?
- iv. Bohr's theory of hydrogen atom is based upon several assumptions. Do any of these assumptions contradict classical physics?
- v. Explain why laser action cannot occur without population inversion between atomic levels?
- vi. What are isotopes? What do they have in common and what are their differences?
- vii. How can radioactivity help in the treatment of cancer?
- viii. Define mass defect and binding energy.
- ix. What are leptons? Give an example.

(Turn Over)

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1. Selenium is a
A) conductor B) insulator C) photoconductor D) semi-conductor
2. The electron volt (eV) is the unit of
A) electric current B) electric energy C) electric potential D) electric flux
3. The drift velocity of electrons is of the order of
A) 10^{-2} m/s B) 10^{-3} m/s C) 10^3 m/s D) 10^6 m/s
4. If a charge is at rest in a magnetic field then the force on charge is
A) $q(\vec{V} \times \vec{B})$ B) $q V B \sin\theta$ C) $q V B$ D) zero
5. The SI unit of magnetic induction is
A) weber B) henry C) tesla D) gauss
6. Emf is induced due to change in
A) electric flux B) magnetic flux C) electric potential D) electric current
7. Mutual induction has a practical role in the performance of the
A) motor B) generator C) choke D) transformer
8. In RLC series circuit, the current at resonance frequency is
A) minimum B) maximum C) zero D) infinite
9. At high frequency, the value of reactance of capacitor will be
A) large B) small C) zero D) infinite
10. Which one of the following is a polymeric solid
A) glass B) nylon C) copper D) zinc
11. In P-type substances, the minority charge carriers are
A) holes B) protons C) electrons D) neutrons
12. The output resistance of an operational amplifier is
A) high B) low C) zero D) equal to input resistance
13. Wave nature of light appears in
A) pair production B) compton effect C) photoelectric effect D) interference
14. The unit of Plank's constant is
A) Volt B) JS C) JS^{-1} D) eV
15. Balmer series lies in the region of electromagnetic spectrum
A) infra-red B) visible C) ultraviolet D) far infrared
16. The S.I unit of radiation dose is
A) roentgen B) curie C) grey D) rem
17. The binding energy per nucleon is maximum for
A) uranium B) platinum C) hydrogen D) iron

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SUBJECTIVE

Note: Section I is compulsory. Attempt any THREE (3) questions from Section II.

(SECTION - I)

(2 × 8 = 16)

2. Write short answers to any EIGHT questions.

- If a point charge q of mass m is released in a non-uniform electric field with field lines pointing in the same direction, will it make rectilinear motion.
- Electric lines of force never cross; why?
- Prove that: $E = -\frac{\Delta V}{\Delta r}$
- Find electric intensity of field inside a hollow charged sphere.
- Why the voltmeter should have a very high resistance?
- How can you use a magnetic field to separate isotopes of chemical element?
- How can we increase the sensitivity of galvanometer?
- What is the function of 'X' and 'Y' plates in C.R.O?
- Can an electric motor be used to drive an electric generator with the output from the generator being used to operate the motor?
- How would you position a flat loop of wire in a changing magnetic field so that there is no emf induced in the loop?
- What is the function of the commutator in D.C motor?
- Discuss the relation: $V = \epsilon + IR$

(2 × 8 = 16)

3. Write short answers to any EIGHT questions.

- Define Kirchhoff's Second Rule.
- Why does the resistance of a conductor rise with temperature?
- A potential difference is applied across the ends of a copper wire. What is the effect on the drift velocity of free electrons by decreasing the length and the temperature of the wire?
- At what frequency will an inductor of 1.0 H have a reactance of 500 Ω ?
- Explain the conditions under which electromagnetic waves are produced from a source.
- In a R-L circuit, will the current lag on lead the voltage? Illustrate your answer by a vector diagram.
- What is meant by paramagnetic and diamagnetic substances? Give example for each.
- What is meant by hysteresis loss? How is it used in the construction of a transformer?
- Define intrinsic and extrinsic semiconductor.
- How gates are used in controlling systems?
- Why ordinary silicon diodes do not emit light?
- What is the net charge on an n-type or a p-type substance?

(2 × 6 = 12)

4. Write short answers to any SIX questions.

- Write two postulates of special theory of relativity.
- What are the measurements on which two observers in relative motion will always agree upon?
- Why do not we observe a "Compton Effect" with visible light?
- Write postulates of Bohr's Model of the hydrogen atom.
- What do we mean when we say that the atom is excited?
- Define the term "Isotopes" and give one example.
- Differentiate between "Mass Defect" and "Binding Energy".
- Why are heavy nuclei unstable?
- What do we mean by the term "Critical Mass"?

(Turn Over)